DOCUMENT RESUME

ED 234 534 EC 160 401

AUTHOR Wesson, Caren
TITLE Data Based Program Modification: A Disk for Monitoring Student Progress.
PUB DATE Mar 83
NOTE 18p.; Paper presented at the Council for Exceptional Children Topical Conference on the Use of Microcomputers in Special Education, (Hartford, CT, March 10-12, 1983).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Computer Managed Instruction; *Computer Programs; *Disabilities; Elementary Secondary Education; *Formative Evaluation; Program Evaluation; *Student Evaluation
IDENTIFIERS Data Based Program Modification

ABSTRACT

The paper describes a microcomputer disk, Data Based Program Modification (DBPM), which allows special and regular educators to monitor the progress of each student, thereby perceiving the effectiveness of the instructional program. The advantages of such a formative evaluation approach are considered. The development of the DBPM is outlined in its three stages: (1) identification of the behaviors to be measured in reading, spelling, and written expression; (2) development of technically adequate measurement procedures for measuring those behaviors; and (3) an exploration of alternative approaches for using the data to make decisions about instructional effectiveness. Results of pilot studies and field tests are reported, technical information is given, and additional services of the founding company (including training on procedures for setting goals and objectives and the application of the data for program evaluation) are described. (CL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

ED234534

Data Based Program Modification:

A Disk for Monitoring Student Progress

A paper prepared for CEC's Conference on Microcomputers in Special Education

Caren Wesson
Data Based Associates

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Caren Wesson

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

EC160401

Purpose

The purpose of this paper is to describe a microcomputer disk developed by Data Based Associates (DBA), a newly developed private organization. DBA consists of special educators, school psychologists, and research scientists with extensive experience in teacher training, consultation, and computer applications. The software developed by DBA is titled Data Based Program Modification (DBPM). DBPM enables a teacher to select a measurement system unique to the curriculum that allows the progress of each student to be monitored. Data generated from routinely scheduled student performance samples, one to three minutes in duration, are examined through graphic analysis or simply entered into the DBPM computer software package. While the computer package is not necessary for progress decisions to be made, it offers the advantage of an instantaneous print-out which informs the teacher of the effectiveness of the current instructional program.

If the instructional program is not likely to meet the projected goals, the computer program will recommend that the teacher make a change in instruction. A print-out of student performance over time along with simple, evaluative statements is available, providing school personnel with a hard copy. For administrators, DBA provides a service to aggregate information across students for purpose of program evaluations and summaries.

The remainder of this paper will describe the research and development process supporting DBPM, the procedures used, and additional services available through Data Based Associates.

Research and Development

In recent years greater demands have been placed on educators, especially special educators, to be accountable for the quality of educational decisions and the ways in which decisions are made. A number of criteria to be followed in assessment and decision-making procedures have been outlined in PL 94-142. Implementation of this part of the law has proved to be difficult due to the absence of technical knowledge that would enable schools to comply with the intent of the law as well as the procedures outlined in the law. In response to this problem, a program of research and development was established that has had as its goal developing a functional system for developing and monitoring progress on IEP goals, as intended in PL 94-142.

One objective of this research and development program has been to determine empirically the effects of teachers using the formative evaluation system on student achievement in reading, spelling, and written expression. If we are to achieve substantive as well as procedural compliance with the law (Deno & Mirkin, 1980) we must determine whether using the formative evaluation system increases teacher success in developing student programs. In answering this question our focus has been on the IEP adjustment decision that teachers make once special education is being provided for a student. The formative evaluation system is an assessment device for monitoring the effectiveness of the IEP. The hypothesis is that if an adequate system of formative evaluation is developed, teachers may use this system to monitor student progress and the effectiveness of their

instruction. If student progress is not adequate, then teachers judge their instruction to be ineffective and modify their instruction in an attempt to improve the student's progress.

The rationale underlying this hypothesis rests on a set of assumptions. First, the success of special education is defined by the extent to which students' academic and social behaviors are improved. Second, for any mildly or moderately handicapped student, it is impossible to reliably identify special educational alternatives that will be more effective than the regular classroom program. Given the first two assumptions, the initial IEP then must be viewed as a guess about what might be helpful to the student rather than a plan that is guaranteed to help. If the IEP is only a guess, then there is no alternative but to continuously evaluate the effectiveness of the IEP and to modify it when it is unsuccessful. Under such conditions, teachers should be able to increase the success of special education by systematically measuring student progress toward the achievement of program goals and then adjusting student programs to enhance that progress. In a responsive system such as this, student performance data function as the most useful "vital signs" of whether a program is working or should be changed. A evaluation system, when effective, allows teachers to empirically test their best hunches about how to help students.

One desirable characteristic of a formative evaluation system is that it be useful for monitoring the effects of any type of instruction. For example, whether the teacher chooses DISTAR, a basic sight word method, or any other approach to teach reading, the

monitoring system should accurately measure the student's progress in reading, and it must be unbiased with respect to various theoretical approaches to teaching.

Stage One

In order to accomplish the goal of the research and development program, a three-stage plan was designed. Stage One included: (a) the identification of the behaviors to be measured in reading, spelling, and written expression, (b) the development of technically adequate measurement procedures for measuring those behaviors, and (c) an exploration of alternative approaches (rule sysems) for using the data generated by these measures to make decisions about the effectiveness of instruction. The studies in Stage One were intended to lay a foundation for subsequent engineering of a generic formative evaluation system. Identifying valid simple measures of student performance was critical since later development of the evaluation system rested on whether performance data that were technically adequate could be easily and frequently collected.

Consistent with the intent of the three-stage plan, measurement and evaluation procedures were developed for three academic areas (reading, spelling, and written expression). The focus of the present investigation, however, was the use of the procedures when the IEP goal was reading. Therefore, the remainder of this introduction is restricted to reading.

The basic strategy used to identify useful measures involved a process of elimination. Initially, a pool of five easily measured reading behaviors was generated through a review of the available

literature. The behaviors measured in reading included: (a) reading isolated word lists; (b) reading isolated words in context; (c) reading aloud from text; (d) identifying deleted words in text; and (e) giving word meanings (Deno, Mirkin, & Chiang, 1982). The next step was to develop simple standardized measurement procedures. Specific directions were devised that could be used routinely to conduct assessment. These specifics included how to choose a sample and provide directions to the student. The third step was to determine the criterion validity of the measurement procedures by correlating the scores obtained from them with scores on commercially available standardized measures, with program placement, and with grade level. The measures that were not reliable or valid, or those that were deemed less acceptable with respect to any other desired characteristics, were eliminated from the pool.

The results of the criterion validity research led to the conclusion that reading aloud from a basal text is an optimal behavior to measure in reading. The rationale for this selection includes the fact that reading aloud provides a broader range of scores than isolated words and relates somewhat more closely to comprehension. In addition, reading aloud requires little teacher preparation since a teacher can simply randomly select a passage and direct a child to read aloud. The procedures for measuring reading aloud have been detailed in a manual available through DBA and are briefly described in the procedures section of this paper.

Once the procedures had been developed for measuring reading, the next step in Stage One of the research program was to investigate two

procedures for writing objectives. Short-term objectives (STOs) are based on the long-range goals, which are developed using a formula and the student's scores from the reading-aloud measure. STOs can be written so that measurement is on a standard task (e.g., reading aloud at a specific level of a reading series) or measurement can be based on a standard criterion applied to sequential tasks (e.g., mastery of units in a basal reader). Both procedures for writing objectives were adequate (Fuchs, Wesson, Tindal, Mirkin, & Deno, 1982).

At the same time, several studies were conducted to examine various procedures for using the data generated from the administration of the generic measures. Analyses of student performance data indicated that students showed greater academic growth when a data utilization strategy was in effect than when teachers did not use the data systematically (Martin, 1980; Mirkin, Deno, Tindal, & Kuehnle, 1980). Questionnaires designed to evaluate teacher satisfaction with two alternative data-utilization strategies revealed that teachers preferred to use a combination of the two strategies over using either strategy alone (Fuchs et al., 1982). This finding contributed to the design of the data-utilization strategy employed in Stage Three studies. This strategy is described in the procedures section of this paper.

Stage Two

Stage Two consisted of improving the logistical feasibility (Lovitt, 1977) of the formative evaluation system, as measured by teacher efficiency and satisfaction. No system of formative evaluation would be useful if teachers found it to be too time

consuming or if they were dissatisfied with other aspects of the system. Without efficiency and teacher acceptance, the formative evaluation system probably would not be used regardless of its value in monitoring student progress.

A series of field tests was conducted with a cooperating school district. The results indicated that with practice and systematic attempts to reduce measurement time, teachers were able to increase their efficiency 15 times over. At the end of the study teachers required on the average only two minutes to prepare for measurement, conduct a one-minute assessment, and score and graph the results (Fuchs, Wesson, Tindal, Mirkin, & Deno, 1981). These teachers were also highly satisfied with the evaluation procedures. When questioned by independent evaluators the teachers stated that: (a) the system eliminated much of the jargon, ambiguity, and vague descriptions once found in IEPs; (b) the system met the real intent of the law; (c) their own testing was now relevant to the instruction being provided in the classroom; (d) they were confident in the reliability of their test, making decisions easier and meetings shorter; (e) their testing was more meaningful because a student is compared with peers from his/her own school and grade level; (f) the students were more aware of their own progress because of the frequent charting required by the data-based system; (g) their ability to measure the effectiveness of their teaching strategies with any particular student was improved; and (h) the system made writing IEPs much easier (Wesson, Deno, & Mirkin, 1982). These results clearly suggest that this monitoring system not only is logistically feasible, but, in fact, has practical

advantages.

Stage Three

Stage Three of this research and development plan brings the focus of research back to the primary goal: to determine the effects of teachers' use of formative evaluation on student achievement. Preliminary findings on this topic are encouraging. Results of a study involving 39 large city school teachers indicated that implementation of the frequent, direct measurement and evaluation procedures affected positively both student achievement and student awareness of their own achievement. Students of experimental teachers performed better than students of comparison teachers on virtually all achievement measures, rate and accuracy in reading aloud from text materials, and the Structural Analysis and Reading Comprehension subtests of the Stanford Diagnostic Reading Test. It is worth noting that while the former measure (reading aloud from text) was used throughout the study, the latter two were not directly measured by the teachers as part of the evaluation system. The findings suggest that when teachers repeatedly employ the simple one-minute test of reading aloud from text passages to index student progress, they can interpret student gains as representing general reading achievement; that is, the data apparently validly reflect fluency, decoding, and comprehension. The only measure on which experimental and contrast group performance was undifferentiated was error scores on the third grade oral reading passages. This may be explained by the poor reliability of such error scores (Deno, Mirkin, Chiang, & Lowry, 1980; Fuchs & Deno, 1981; Fuchs, Deno, & Marston, 1982). Consequently, the

results of this study suggest that technically adequate, repeated curriculum-based measurement, when used by teachers to evaluate and modify programs, positively affects student achievement.

In addition to achieving better, the students in this study were more knowledgeable about their own learning when their teachers used systematic measurement and evaluation procedures. As compared to pupils whose progress was measured and evaluated via conventional special education practice, students who were measured and evaluated repeatedly and systematically in their curricula (a) more frequently said they knew their goals, (b) more often actually stated their goals, (c) were more accurate in their estimates of whether they would meet their goals, and (d) more typically reported that they relied on data to formulate estimates of whether they would meet their goals. The results revealed that repeated, direct systematic measurement and evaluation enhances not only students' reading achievement, but also their knowledge concerning their own learning. These outcomes are theoretically and socially important. On the one hand, they support the hypothesis of many educational psychologists (Bandura, 1982; Crow & Crow, 1963; Farnham-Diggory, 1972; Prentice, 1961), that students' knowledge of their learning may improve academic performance. On the other hand, increased participation by students in their own education, itself, is often regarded as an important educational goal.

This study generally provides support for increased use of systematic, on-going measurement and evaluation of student progress by teachers. It provides evidence that individual special education programs can be monitored continuously and improved as required to

increase the likelihood of student gains. The findings of this research contradict the conventional argument that teachers do not need to use frequent measurement and evaluation because (a) they are already sufficiently aware of student achievement, and (b) such procedures are inefficient. Teachers who used frequent measurement and systematic evaluation were more effective in enhancing student growth and student awareness of their educational programs.

Procedures used with DBPM

Teachers using DBPM require training to carry out a specific set of procedures, including establishing an appropriate measurement level, writing long-range goals (LRGs) and short-term objectives (STOs), collecting three oral reading scores per week for each student, inserting the data into a disk or plotting the scores on a graph, and using the data in making decisions about the effectiveness of students' instructional programs.

Measurement. Reading measurement consists of one-minute timed samples of reading from the student's curriculum. Both words correct and incorrect are scored and charted on equal interval charts. The level of stimulus material for testing, which also represents baseline level, is selected as the level from which the student reads aloud about 50 words per minute.

Writing goals. Teachers are instructed to write long-range goals for the student's IEP using both the entry level criterion and a desired year-end mastery criterion, usually 90 to 150 words correct per minute with no more than 7 errors. The format used in writing the long-range goal is similar to the following example.

In 32 weeks when presented with stores from Level G, Ginn 720, John will read aloud at the rate of 110 words per minute with 7 or fewer errors.

Writing objectives. For performance objectives, in order to compute the short-term objective, teachers first subtract the baseline level of performance from the criterion level listed in the LRG. Dividing this difference by the number of weeks necessary until the annual review, they arrive at the number of words per week gain necessary to meet the long-range goal criteria. The measurement task is a random sample of items from a constant set of stimuli, and the goal is to improve the level of performance on that stimulus material. In graphing performance measurement, the horizontal axis represents successive school days and the vertical axis represents the level of performance on a constant measurement task; each data point represents the level of proficiency on that constant measurement task. The line of best fit through the data points depicts the student's rate of improvement in performance on the set of stimulus material.

Data utilization. In addition to measuring and writing goals and objectives, the teachers are trained in the use of the measurement procedures for evaluation of the instructional program. In order to monitor student growth, the baseline reading level and the long-range goal are connected by an aimline that showed the student's desired progress. This aimline appears on the Apple disk. Every seven data points, the computer monitors student growth by means of statistically method (White & Haring, 1976). An example is given in Figure 5. If the student was progressing at a rate equivalent to or greater than

that indicated by the aimline, the instructional program was continued; if the projected rate of growth was less than that indicated by the aimline, teachers were directed to make a major change in the student's instructional program.

Technical information on DBPM. Currently DBPM is Apple compatible. It requires the use of an Apple II plus microcomputer with 48K memory. Compatibility with other systems is in progress with information upon request. Each 5¼" diskette is available in three formats:

(1) Program A is designed to measure and evaluate the performance of 20 students in reading, spelling, written expression and math over a one-year period.

(2) Program B assists the teacher in analyzing the reading and math performance of 40 students over a one-year period.

(3) Program C allows the progress of 40 students to be monitored over one year in written expression and spelling.

Additional Services Offered by DBA

Data Based Associates provides training via in-service workshops designed to illustrate basic data collection and goal setting techniques. A typical training program focuses on:

- the measurement procedures for each academic area
- procedures for setting goals and objectives
- the use of the data for program evaluation
- the use of unique DBA designed micro-computer software
- the application of the computer generated data for program evaluation

Data Based Associates also offers consultation to school districts regarding the implementation of these progress-monitoring procedures. Consultation services are uniquely designed to meet the needs of each district.

DBA includes: Stanley Deno, PhD, University of Minnesota; Doug Marston, PhD, University of Minnesota; Bernard Mirkin, PhD, Yale University, M.D., University of Minnesota; Mark Shinn, PhD, University of Minnesota; Jerry Tindal, PhD, University of Minnesota; Caren Wesson, M.A., Western Michigan University. Their research has been published in such journals as Exceptional Children, Journal of Special Education, Teaching Exceptional Children, Journal of Learning Disabilities, Learning Disability Quarterly, Journal of Pharmacology and Experimental Therapeutics, and Clinical Pharmacology and Therapeutics.

For more information, contact:

Data Based Associates
973 Laurel
St. Paul, Minnesota 55104
(612) 221-0046

References

Bandura, A. Self-efficacy mechanism in human agency. American Psychologist, 1982, 37(2), 122-147.

Crow, L. D., & Crow, A. Readings in human learning. New York: David McKay, 1963.

Deno, S., & Mirkin, P. Data-based IEP development: An approach to substantive compliance. Teaching Exceptional Children, 1980, 12, 92-99.

Deno, S. L., Mirkin, P. K., & Chiang, B. Identifying valid measures of reading. Exceptional Children, 1982, 49, 36-45.

Deno, S. L., Mirkin, P. K., Chiang, B., & Lowry, L. Relationships among simple measures of reading and performance on standardized achievement tests (Research Report No. 20). Minneapolis: University of Minnesota, Institute for Research on Learning Disabilities, 1980. (ERIC Document Reproduction Service No. ED 197507)

Farnham-Diggory, S. Cognitive processes in education: A psychological preparation for teaching and curriculum development. New York: Harper & Row, 1972.

Fuchs, L. S., & Deno, S. L. The relationship between curriculum-based mastery measures and standardized achievement tests in reading (Research Report No. 57). Minneapolis: University of Minnesota, Institute for Research on Learning Disabilities, 1981. (ERIC Document Reproduction Service No. ED 212 662)

Fuchs, L. S., Deno, S. L., & Marston, D. Use of aggregation to improve reliability of simple direct measures of academic performance (Research Report No. 94). Minneapolis: University of Minnesota, Institute for Research on Learning Disabilities, 1982.

Fuchs, L., Wesson, C., Tindal, G., Mirkin, P., & Deno, S. Instructional changes, student performance, and teacher preferences: The effects of specific measurement and evaluation procedures (Research Report No. 64). Minneapolis: University of Minnesota, Institute for Research on Learning Disabilities, 1982.

Lovitt, T. In spite of my resistance, I've learned from children. Columbus, OH: Charles E. Merrill, 1977.

Martin, M. A. A comparison of variations in data utilization procedures on the reading performance of mildly handicapped students. Unpublished Doctoral Dissertation, University of Washington, 1980.

Mirkin, P., Deno, S., Tindal, G., & Kuehnle, K. Frequency of measurement and data utilization strategies as factors in standardized assessment of academic skill. Journal of Behavioral Assessment, in press.

Prentice, W. C. H. Some cognitive aspects of motivation. American Psychologist, 1961, 16, 503-511.

Wesson, C., Deno, S., & Mirkin, P. Research on developing and monitoring progress on IEP goals: Current findings and implications for practice (Monograph No. 18). Minneapolis: University of Minnesota, Institute for Research on Learning Disabilities, 1982.

White, O. R., & Haring, N. O. Exceptional Teaching, Columbus, OH: Charles E. Merrill, 1980.